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 TI Low residue **soldering paste** having good printing -
 formed by mixing powdered **solder** with flux contg **rosin**
 based agent, activator, thixo agent and solvent.
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Soldering paste is formed by mixing powdered
solder with flux. The flux comprises a 5-60 weight%-carrier component
 containing a **rosin**-based major effect agent, an activator and a
 thixo agent and a 40-95 weight%-solvent. The solvent contains alkyl gp. 1-4C
 2,5-dialkyl-2,5-hexane diol and/or 2,2-dialkyl 1,3-propane diol, 5-30
 weight%.

The **rosin**-base major effect agent comprises: **rosin**
 or a **rosin** derivative The activator comprises: organic amine
 hydroacid salt **halide**, organic acid, or organic amine. The thixo
 agent comprises: hydrogen addition castor oil, fatty acid amides or oxy fatty
 acid.
 Dwg.0/0

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Notes:

1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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FULL CONTENTS

[Claim(s)]

[Claim 1] In the soldering paste mixed to flux, said flux powder solder A rosin system main effect agent, It consists of 5 to 60 weight % of carrier components and 40 to 95 weight % of solvents containing an activator and a CHIKISO agent. The low residue soldering paste characterized by being that in which this solvent contains the 2 of carbon number 1-4 of alkyl group, 5-dialkyl 2, 5-hexandiol and/or 2, and 2-dialkyl 1, and 3-propanediol five to 30weight %.

[Detailed Description of the Invention]**[0001]**

[Industrial Application] This invention relates to a low residue type soldering paste suitable for using it by the soldering paste which consists of the uniform mixture of flux and powder solder especially inertness, or a reducing atmosphere.

[0002]

[Description of the Prior Art] Soldering paste (it is also called cream solder) Powder solder is mixed with paste state flux, and it is considered as paste state solder. Even if a soldering paste has rheology suitable for printing and adhesion, and can apply it with sufficient precision easily by printing and it uses neither a binder nor adhesives independently Adhesion maintenance of the components which should be soldered can be carried out, and it has the feature that many components can be further soldered at once by the means of atmosphere heating, such as a reflow furnace. It has contributed to development of the surface mounting method in the printed circuit industry dramatically.

[0003] Soldering which uses a soldering paste is carried out as follows, for example. First, it is a soldering paste to the soldering part of the surface of a circuit plate. After printing using a stencil and a squeegee, using the tackiness of the printed soldering paste and carrying out temporarily fixing of an integrated circuit module, a chip capacitor, chip resistance, or other surface mounting electronic parts, it solders by fusing solder using heating apparatus, such as a reflow furnace.

[0004] Thus, a treatment process is simplified substantially, and moreover, since the surface mounting soldering method of the electronic parts using cream solder is accurate, it comes to be briskly used in connection with the densification of the latest electron device, or the necessity for cost reduction, and is becoming the mainstream of soldering.

[0005] The presentation of a soldering paste generally used from the former is powder solder. It is 8 to 15 weight % of 85 to 92-weight % flux. The presentation of the flux is rosin or a rosin derivative. The 50 to 70-weight % CHIKISO agent 2-7 Weight % activator 0.1-5 Weight % solvent It is 30 to 45 weight %.

[0006] Rosin or a rosin derivative is the main effect agent of flux, names generically components other than the solvent which included the CHIKISO agent and the activator in this, and calls them the carrier component of flux. A soldering paste is made by cooling and mixing powder solder uniformly to paste state, nothing, and this paste state flux, after carrying out the heating dissolution of the component of flux and considering it as a homogeneous solution.

[0007] As the characteristics that this kind of soldering paste should be provided, (1) That there is no separation with solder powder and flux, and (2) It can print smoothly [when it prints using a screen or a stencil], (3) When electronic parts are placed on the printed soldering paste, tackiness is in a soldering paste and electronic parts can be held, (4) Also when a form collapsed and carries out preheating of the printed soldering paste, a form does not collapse, (5) When you heat with a reflow furnace etc. after printing the soldering paste to the circuit plate and carrying out temporarily fixing of the electronic parts, there needs to be no development of a solder ball, (6) The flux residues of after soldering and a soldering paste are that there is no corrosiveness and electric insulation is excellent and (7). A flux residue can carry out dissolution clearance easily in washing by a cleaning agent (usually a chlorofluocarbon system or a chlorine-based cleaning agent).

[0008] When a flux residue remains after soldering by a soldering paste, there are the following nonconformities.

(a) If comparatively many flux residues remain, soldering performed after about [being unsightly] and soldering using the pin for inspection is perfect, and energization inspection of whether equipment fully functions cannot be conducted.

(b) When corrosive action or a hygroscopic property is in flux depending on the combination presentation of flux and electric current is sent at the time of an activity, the corrosion and migration by a flux residue may be induced, or insulation resistance between conductors may be reduced. In especially industrial instrument equipment and the life support system that must carry out moon security of the performance of an instrument for years, it is still more so.

[0009] In order to remove such nonconformity, with soldering by the conventional soldering paste, the organic solvent of a chlorofluocarbon system or a chlorine system washes an electron device after soldering, Although removing a flux residue is performed, an activity tends to be regulated from the problem of environmental destruction, and a chlorofluocarbon system and a chlorinated solvent are expected that an activity is no longer accepted in the future [most].

[0010] Then, the actual condition is the activity of cleaning agents other than a chlorofluocarbon system and a chlorine system, and there being a problem of the waste water treatment of the wash water in backwashing by water, and there being a problem in the activity of other organic solvents in respect of the inflammability and cost, and hardly used till the present, although the activity of backwashing by water or other organic solvents can specifically be considered.

[0011] [the flux used for the conventional soldering paste] In order to fully demonstrate the performance (defecation on the surface of soldering) as flux as combination of the aforementioned flux for a paste, comparatively many the rosin or the rosin derivatives which are a flux main effect agent are included with 50 weight % or more. Therefore, the amount of a solvent is to at most 45 weight %. JP,61-15798,B and JP,S56-154297,A -- a 57-118891 gazette, a 59-153594 gazette, a 60-180690 gazette, and a 60-257988 gazette -- said -- 61-78589 Reference, such as a number gazette and a 61-108491 gazette. Therefore The adhesive power for characteristics desirable as an obtained soldering paste, i.e., printing nature, and components maintenance, As a solvent blended with flux in order to give characteristics, such as the shape retentivity of the soldering paste after printing Comparatively The water-soluble organic solvent, for example, diethylene glycol monobutyl ether, of hypoviscosity, Diethylene glycol monobutyl ether acetate, triethylene glycol monomethyl ether, Tripropylene glycol monomethyl ether, ethylene glycol monophenyl ether, Propylene glycol monophenyl ether, diethylene glycol mono-hexyl ether, Diethylene glycol ****- 2-ethylhexyl ether, ethylene glycol, propylene glycol, dipropylene glycol, butanediol, hexylene glycol, phenol, benzyl alcohol, etc. have been used.

[0012] However, when there was much content, such as a formed element like rosin, a CHIKISO agent, and an activator, washing treatment which a flux residue increases inevitably, therefore was mentioned above was indispensable.

[0013] In JP,2-25291,A, the soldering paste which has solder powder and the binder containing at least one sort of alcohols and which is used by a reducing atmosphere is indicated. Since this soldering paste does not contain flux, it is necessary to solder by the reducing atmosphere which functions also as flux. Since there is no flux when this soldering paste is used by an inert atmosphere, soldering is not performed good. Moreover, this soldering paste is since an organic solvent is mixed with solder powder and it is a request, Paste state is not maintained but solder powder sediments in an organic solvent, and since it dissociates, of course, even if printing is impossible and it is able to apply this soldering paste to a soldering part, tackiness is not enough, and it is difficult to hold the carried electronic parts at that locality.

[0014]

[Problem(s) to be Solved by the Invention] The main object of this invention is (1). [the flux residue after soldering] The soldering paste in which the grade hardly accepted visually has few flux residues, a result is good, and the energization inspection using a pin is easy is offered, (2) Even if a flux residue remains after soldering, it is so reliable that there are few the amounts of residue and it is unnecessary in the clearance. (there is no corrosiveness of a flux residue and insulation is good) A soldering paste is offered, And (3) It is that printing nature offers the soldering paste which tackiness is in a sufficiently usable field and can hold electronic parts good without borrowing the assistance of adhesives.

[0015]

[Means for Solving the Problem] Even if this invention persons reduce conventionally the total quantity of carrier components, such as rosin used in 55weight % or more of the amount, to 40 or less weight % in flux of a soldering paste Not only a reducing atmosphere but when a reflow was carried out by an inert atmosphere, it found out that acted effectively as a soldering paste and the soldering paste which has few flux residues and is unnecessary in the solvent wiping removal of the flux residue after soldering by that cause was obtained. And when a carrier component was reduced in this way, it found that the 2-alkyl 1 and 3-hexandiol are also suitable especially as a solvent, and it applied as Tokuganhei2-410680 previously.

[0016] By subsequent investigation, [some above-mentioned solvents] 2 of a carbon number 1-4 of an alkyl group like the 2 of carbon number 1-4 of alkyl group like 2, 5-dimethyl 2, and 5-hexandiol, 5-dialkyl 2, 5-hexandiol and/or 2, and 2-dimethyl 1, and 3-propanediol, and 2 - It knew that the low residue paste which was excellent by replacing by dialkyl 1 and 3-propanediol would be obtained, and this invention was completed.

[0017] The low residue soldering paste to the former is printing nature as compared with a general paste since the amount of solvent is large. (NIJIMI at the time of continuous printing, rolling nature) And inferior to tackiness. Then, when the solid above solvents were added 5 to 30% auxiliary in ordinary temperature, it became possible to have the engine performance equivalent to a common article. Moreover, since the solvent of this solid is a boiling point comparable as the solvent used conventionally, since after a reflow is volatilizing, it does not remain as a part for residue.

[0018] In the soldering paste with which the summary of this invention mixes powder solder to flux here Said flux consists of 5 to 40 weight % of carrier components and 60 to 95 weight % of solvents containing a rosin system main effect agent, an activator, and a CHIKISO agent. This solvent uses the 2-alkyl 1 of the carbon number 1-4 of an alkyl group, and 3-hexandiol as a principal component, for example. It is the low residue soldering paste characterized by being what uses the 2 of carbon number 1-4 of alkyl group, 5-dialkyl 2, 5-hexandiol and/or 2, and 2-dialkyl 1, and 3-propanediol as an additional solvent, and contains them five to 30weight %.

[0019] A reflow of this soldering paste can be carried out in inertness or a reducing atmosphere.

[0020] The powder solder in the soldering paste of this invention is the same as that of what is used for the conventional soldering paste, is good, and chooses a suitable solder by the purpose of use.

The examples of a solder suitable for surface mounting of electronic parts are Sn-Pb, Sn-Pb-Ag, Sn-Pb-Bi, Sn-Pb-In, Sn-Pb-Sb, etc. Although in particular the particle shape or the grain size of powder solder are not limited, if the pitch gap of a lead becomes narrow like these days, a configuration is a grain size in a globular form. 250-400 A mesh grade is desirable.

[0021] A thing useful as a carrier component of the flux used by this invention is the same as that of what has been used for conventional flux, and is good. Specifically, a carrier component contains the main effect agent of a rosin system, an activator, and a CHIKISO agent. Since a portion remains as a flux residue after soldering, the carrier component in flux is carried out 5 to 40weight % of within the limits. If the amount of a carrier component exceeds 40 weight %, if the flux residue after soldering increases and washing clearance is not carried out, a result will be bad, and it will become difficult to do the energization inspection using a pin. When the amount of the carrier component was less than 5 weight % and a reflow is carried out especially by an inert atmosphere, soldering is not performed good, but generates many solder balls, and is not desirable. Therefore, the content with a desirable carrier component is 10 to 35 weight %.

[0022] the rosin or the rosin derivative (for example, gum rosin, wood rosin, polymerization rosin, phenol denaturation rosin) used as a rosin system main effect agent of flux The soldering nature of a soldering paste, printing nature, and tackiness are increased, and it is desirable in the soldering paste of this invention to add in a fairly small amount from about 3 to 30 weight % and the former of flux.

[0023] It is used in order to strengthen the soldering nature (flux operation) of a soldering paste, but in a low residue soldering paste, since an activator has little content of the main effect agent of flux, if the activator of an amount comparable as the former is added, they will increase in number too much. Since a flux residue must be made into a flux residue to the extent that it is not necessary to wash in the soldering paste of low residue, [the addition] It is considered as the amount of the grade which does not spoil the reliability (corrosion, insulation resistance, etc.) of a flux residue, but improves soldering nature, and lessens a development of a solder ball, and does not produce temporal change of a soldering paste. Although an addition changes with classes of activator, an activator is made to exist in about 0.1 to 2weight % of an amount in flux generally.

[0024] As an example of an activator, there are an organic amine halide acid salt, an organic acid, and organic amine. As an example, a diphenylguanidine hydrobromic acid salt, a cyclohexylamine hydrobromic acid salt, a diethylamine hydrochloride, adipic acid, sebacic acid, triethanolamine, monoethanolamine, etc. are suitable.

[0025] A CHIKISO agent prevents separation of flux and solder powder, and adds it in sufficient amount to adjust so that printing of the viscosity of a soldering paste may be attained. Generally a CHIKISO agent is added four to 10weight % in flux. The examples of a suitable CHIKISO agent are hydrogenation castor oil, fatty acid AMAIDO, hydroxy fatty acid, etc.

[0026] It is what is characterized by using for this invention the additional solvent mentioned later. Although not restricted especially as a main solvent, the 2-alkyl 1 and 3-hexandiol which are preferably shown by the 2-methyl 2, 4-pentanediol, alpha-terpineol, or the following formula as a main

solvent are used as a solvent principal component in flux.

[0027] R is the alkyl group of a carbon number 1-4, for example, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, etc. among $\text{CH}_2(\text{OH})\text{CH}(\text{R})\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{CH}_3$ type. Especially the solvent whose R is ethyl is desirable.

[0028] Each of such branched chain diols has the boiling point of the grade which volatilizes in a reflow, and since the viscosity in 20 degrees C is high, they are convenient to especially manufacture of a low residue soldering paste. For example, the viscosity in boiling point 243.2 ** and 20 degrees C of the 2-ethyl 1 and 3-hexandiol which can be obtained easily industrially is 323 cP.

[0029] According to this invention, at least one sort is further blended with a solvent five to 30weight % in a following component.

** 2 of the carbon number 1-4 of an alkyl group, the 5-dialkyl 2, 5-hexandiol, For example, 2, the 5-dimethyl 2, 5-hexandiol $\text{CH}_3\text{C}(\text{CH}_3)(\text{OH})\text{CH}_2\text{CH}_2\text{C}(\text{CH}_3)(\text{OH})\text{CH}_3$ fusing point 87-88.5 degrees C, Boiling point Carbon number 1-4 of a 214 - 215 **** alkyl group The 2 and 2-dialkyl 1, 3-propanediol, For example, the 2 and 2-dimethyl 1, 2C(CH₂OH) 3-propanediol (CH₃) 2 fusing point 126-130 **, Boiling point when such [211 degrees C] a solvent is independently used for the soldering paste of 50% or more of the conventional carrier component Although viscosity is too high and does not serve as a soldering paste which can be printed, when combining and using the above-mentioned 2-alkyl 1 and 3-hexandiol for the soldering paste of low residue used as a solvent, the optimal viscosity, printing nature, and tackiness are acquired. Since this still has the very lower vapor pressure in ordinary temperature, it has the advantage that continuous printing is possible, and the steam is harmless to a human body.

[0030] [solvents which it has been used upwards for conventional flux and listed on the other hand] The viscosity altogether 0.5 - 50 cP Even if it is low, and is able to adjust the amount of a CHIKISO agent and is able to make a low residue paste using these solvents, a soldering paste cannot roll these pastes at the time of printing, and they cannot be printed. 60 to 95 weight % of solvents are made to exist in 65 to 90weight % of an amount preferably in flux. The amount of the solvent used is adjusted so that the rosin and the CHIKISO agent in a carrier component may be adjusted and a suitable viscous soldering paste may be obtained within the limits of this.

[0031] A solvent uses the 2-alkyl 1 and 3-hexandiol as a principal component. Only the 2-alkyl 1 and 3-hexandiol of the solvent which consists only of 2-ethyl 1 and 3-hexandiol especially are intrinsically desirable. Some above-mentioned whole solvents [5 to 30weight % of], i.e., a solvent, are replaced, for example by the 2, 5-dimethyl 2, 5-hexandiol and/or 2, and 2-dimethyl 1 and 3-propanediol. This is hereafter called additional solvent. When an effect expected in an additional solvent since less than 5% is not enough as viscosity is not acquired but 30% is exceeded on the other hand, viscosity is too high and printing becomes impossible.

[0032] A little hyperviscous organic solvents, such as other solvents, for example, the aforementioned hypoviscosity organic solvent used into flux from before, or alpha-Tell Young Pioneers, can be mixed, and the viscosity of flux can also be adjusted. Although less than about 50 weight % of the amount of

other solvents used of these can be made to exist in flux, it is desirable to consider it as about 30 or less weight %.

[0033] [this invention person] as a solvent of the flux for soldering pastes which reduced the carrier component It found out that especially combination with the 2-alkyl 1, 3-hexandiol, 2, 5-dimethyl 2 and 5-hexandiol or 2, and 2-dimethyl 1 and 3-propanediol was suitable. Specifically, an activity of this solvent will acquire the following advantage.

[0034] (1) Since it is hyperviscosity extremely, it is more possible than the solvent of flux for soldering pastes used by the former to be able to make the soldering paste of low residue, to often roll a soldering paste at the time of printing, and to supply a soldering paste good into a stencil.

[0035] (2) A boiling point is 243 **, and since the vapor pressure in ordinary temperature is low, continuous printing is possible, and since the adhesive power of the soldering paste after printing is held for a long time, loading of electronic parts is easy.

[0036] (3) This solvent does not have the toxicity over a human body.

(4) Since the whole of this solvent evaporates at the time of soldering, the flux residue after soldering serves as only a carrier component, and there is neither corrosive buildup by un-evaporating of a solvent nor lowering of insulation resistance nor a development of migration.

[0037] On the other hand, when the solvent of the above-mentioned hypoviscosity used conventionally is used for the soldering paste of low residue with many amounts of solvents like this invention for example, the following trouble happens.

[0038] (1) Since viscosity is too low as a soldering paste and there is no tackiness, a soldering paste does not roll by squeegee printing and a soldering paste cannot be well supplied to a soldering part.

[0039] (2) Since itself will be soft and it will be liquid even if it is able to supply, the printed configuration cannot be held, but a soldering paste adheres in addition to a soldering part, and soldering is poor. (development of a solder ball) It becomes a cause.

[0040] (3) Even if the first printing is possible, since this soldering paste is softly liquid, a soldering paste's printing [a surroundings lump and] it become impossible on the back side of a printing stencil.

[0041] The soldering paste of this invention can be manufactured with a conventional method. First, after heating each component of flux together and considering it as solution form, it cools in ordinary temperature and a paste is obtained. A soldering paste will be done if it mixes with powder solder uniformly at this. The mixing ratio of powder solder and flux has the desirable rate of about 85-92 copies of powder solder, and about 8-15 copies of flux by weight. It is within the limits of about 88-92 copies of powder solder, and about 8-12 copies of flux more preferably.

[0042] Since the viscosity as a soldering paste is [within the limits of about 1000 to 2500 P] desirable, if required of the Malcolm viscometer (a spiral viscometer, 10 rpm) in 25 degrees C, it will add a CHIKISO agent and will adjust the viscosity of flux. An example explains this invention in more detail hereafter.

[0043]

[Example] Globular form solder of 60 Sn-Pb (grain size 270 mesh) It mixed with the flux 9 weight part and homogeneity of various presentations of 91 weight parts, and the soldering paste was produced. the used flux -- polymerization rosin (main effect agent) The 2-methyl 2 and 4-hexandiol (solvent) The 2, 5-dimethyl 2, 5-hexandiol and/or 2, and 2-dimethyl 1, 3-propanediol (additional solvent) Hydrogenation castor oil (CHIKISO agent) Diphenylguanidine hydrobromic acid salt (activator) In and the case alpha-Tell Young Pioneers were mixed as other solvents at a rate shown in Table 1, and after heating this mixture and considering it as a homogeneous solution, it prepared by cooling.

[0044] Because of a comparison, it is the most common diethylene glycol monobutyl ether as a solvent of the conventional flux for soldering pastes. (butyl carbitol) It reaches and is an example of the same branched chain diol as this invention. The flux which uses as a solvent the 2-methyl 2 currently used for the JP,56-154297,A number by flux of disclosure and 4-pentenediol was mixed with solder like the above, and the soldering paste was produced.

[0045] In addition, it is the soldering paste which becomes JP,2-25291,A from the solvent and the powder solder of a description as a solvent. When it produced using 1 and 6-hexandiol and the check was presented, printing was impossible, but when the additional solvent was added to this, the outstanding effect as shown in an example 5 was acquired.

[0046] While measuring the viscosity of the obtained soldering paste by 25 degrees C and 10 rpm using the Malcolm viscometer, the following way estimated the energization inspection by the printing nature of a soldering paste, tackiness, viscosity, the amount of the flux residue after soldering, and pin contact.

[0047] It is a metal mask to a printed plate board about a printing nature soldering paste. (0.2 mm thickness) It is used. It prints using a squeegee, a soldering paste rolls on a metal mask, and a soldering part can be supplied, or it is a printing condition. (bleeding a blur, a bridge, etc.) Visual observation was carried out and printing nature was judged.

[0048] adhesive U.S. IPC specification (Interconnecting and Packaging Electronic Circuits) -- doing the adhesive check specified to SF-819 -- the adhesive power for every neglect time after printing -- g/mm² It expressed with the unit.

[0049] About the substrate used for the solder ball check of the flux residue above, the flux residue which remained was evaluated by viewing in 1-4 steps.

1: What has the fewest residue.

4: What has most residue.

[0050] Energization inspection digital multimeter by pin contact (SC-by Iwasaki Electric Co., Ltd. 7002 type) It was inspected whether it uses, and the head of a pin would be contacted on the same soldered circuit, and it would energize.

The above test result is collectively shown in Table 1.

[0051]

[Table 1]

フ ラ ッ ク ス 組 成														印刷性		粘着性(g/mm ²)		粘度 (P)	フラックス 残渣	ピンコクト による 通電検査
主効果剤	追加溶剤		チキソ剤	活性剤	主溶剤	0-リング 性	ニジミ	0時間 後	4時間 後											
	2,5-ジフェル-2,5- ヘキサジオール	2,2-ジフェル-1,3- -ジオキサール								7フェルマニジン HBr										
実施例 1	10	20	—	7	0.2	2-フェル-2,4- ペンタオール 62.8	良好	発生 せず	2.8	2.7	1400	1.0	通電あり							
" 2	15	15	—	6	0.2	" 63.8	"	"	3.0	3.0	1300	1.0	"							
" 3	25	15	—	6	0.2	" 53.8	"	"	3.1	3.5	1500	1.5	"							
" 4	10	—	30	6	0.2	α -テルピネオール 53.8	"	"	3.0	1.7	1400	1.0	"							
" 5	20	15	—	6	0.2	2-フェル-1,3- ヘキサジオール 58.8	"	"	3.8	4.2	1700	1.5	"							
比較例 1	30	—	—	8	2.0	2-フェル-2,4- ペンタオール 60	不可	発生	1.2	1.6	1300	2.0	通電あり							
" 2	55	—	—	6	2.0	" 37	良好	発生 せず	4.0	4.0	2400	4.0	不可							
" 3	25	—	—	8	0.3	7フェルマニジン 66.7	不可	発生	1.0	0.5	810	1.5	通電あり							
" 4	55	10	—	4	2.0	2-フェル-2,4- ペンタオール 29	硬すぎて印刷 不可		3.5	2.8	測定 不能	4.0	不可							

[0052] as shown in Table 1, the soldering paste of this invention is alike and excellent in printing nature and adhesive all, and was fully able to carry out a reflow in the inert atmosphere. Moreover, there were few flux residues after soldering, the result of the energization check was also good, and it was proved that it was an usable low residue type, without performing the flux solvent wiping removal

by a harmful organic solvent.

[0053]

[Effect of the Invention] The soldering paste of this invention is JP,2-25291,A. Unlike the soldering paste of non-flux of a description, it has good printing nature in a number, and, moreover, a reflow can be carried out to it not only by a reducing atmosphere but by an inert atmosphere. There are many solvents in flux, since there are few carrier components, there are dramatically few flux residues after soldering, and the corrosiveness does not exist, and since insulation is also good, the solvent wiping removal of a flux residue is unnecessary like a non-flux soldering paste. And although there are few carrier components in flux, even if it is the case where a reflow is carried out by an inert atmosphere, it is the performance as flux. (improvement in solder wettability by defecation of a soldering part) It can fully achieve and quality soldering is performed.

[0054] The soldering paste of this invention is (1) of the possession conditions of a soldering paste which are excellent in printing nature and tackiness, and were mentioned above although there were many solvents in flux. - (7) All can be filled. Therefore, the soldering paste of this invention is flux treatment like the conventional flux inclusion soldering paste. It can be used without carrying out, and moreover, unlike the conventional thing, since it is unnecessary, the solvent wiping removal of the flux residue after soldering does not need to use cleaning agents, such as chlorofluocarbon, can simplify soldering substantially, and contributes to abatement of the manufacturing cost of an electron device.

[Translation done.]